65. A reinforcement mat adapted for use in manufacture of a pultruded part where the mat is pulled through a pultrusion die in a continuous longitudinal pull direction, said mat comprising:

a body having a pair of opposed outer surfaces which define the thickness of the mat,

said body including elongated reinforcing fibers oriented in a direction transverse to said pull direction; and

batting material in contact with said reinforcing fibers and including staple fibers, a certain proportion of said staple fibers extending through at least a portion of said mat thickness and randomly entangled with and interconnecting said reinforcing fibers.

66. A reinforcement mat as set forth in claim 65, wherein the entangling staple fibers which extend through at least a portion of the mat thickness are hydro-entangled fibers.

67. A reinforcement mat as set forth in claim 65, wherein the reinforcing fibers extend substantially across the full transverse width of the mat.

68. A reinforcement mat as set forth in claim 65, wherein said generally transverse reinforcing fibers are disposed at an angle of about 60° to about 90° with respect to said longitudinal pull direction.

69. A reinforcement mat as set forth in claim 65, wherein said generally transverse reinforcing fibers are disposed at an angle of about 90° with respect to said longitudinal pull direction.

70. A reinforcement mat as set forth in claim 65, wherein is included transport fibers for the reinforcing fibers arranged at an angle to the reinforcing fibers, said randomly entangled fibers extending through at least a portion of said mat thickness and interconnecting the transport fibers and the reinforcing fibers.

71. A reinforcement mat as set forth in claim 70, wherein said transport fibers include elongated fibers extending diagonally across substantially the full transverse width of the mat and at a predetermined angle with respect to said reinforcing fibers.

72. A reinforcement mat as set forth in claim 68, wherein said transport fibers include first and second elongated diagonal fibers extending diagonally across substantially the full transverse width of the mat with the first diagonal fibers oriented at an angle opposite the angularity of the second diagonal fibers.

73. A reinforcement mat as set forth in claim 72, wherein is provided transport fibers disposed at an angle in the range of about + 30° to about + 60° and transport fibers disposed at an angle of about - 30° to about - 60° with respect to the longitudinal pull direction.

74. A reinforcement mat as set forth in claim 73, wherein is provided transport fibers disposed at an angle of about + 45° and second transport fibers disposed at an opposite angle of about -45° with respect to said longitudinal pull direction.

75. A reinforcement mat as set forth in claim 65, wherein is provided a synthetic resin binder binding the entangling fibers with the reinforcing fibers.

76. A reinforcement mat as set forth in claim 65, wherein at least some of the entangling fibers are heat bonded to the transverse reinforcing fibers.

77. A reinforcement mat as set forth in claim 65, wherein the entangling fibers have a bending resistance less than that of the reinforcing fibers.

78. A reinforcement mat as set forth in claim 68, wherein said transport fibers include elongated fibers extending substantially in said longitudinal pull direction.

79. ~~A reinforcement mat as set forth in claim 75, wherein said elongated transport fibers~~ comprise stitched fibers.

80. A reinforcement mat as set forth in claim 79, wherein said reinforcing fibers are of glass and said elongated stitched fibers are of a polyester resin.

81. A reinforcement mat as set forth in claim 78, wherein said elongated fibers include fibers which extend an angle of from about 0° to about +20° and from about 0° to about -20° relative to said longitudinal pull direction.

82. A reinforcement mat as set forth in claim 65, wherein is provided a series of perforated holes through the thickness of the mat.

83. A reinforcement mat as set forth in claim 82, wherein the series of holes through the thickness of the mat are punched holes.

84. A reinforcement mat as set forth in claim 82, wherein said holes are filled with a resin which increases the reinforcement properties of the reinforcing fibers.

85. A reinforcement mat adapted for use and manufacture of a pultruded part where the mat is pulled along with longitudinal fibers through a pultrusion die in a continuous longitudinal pull direction, said mat comprising:

a body presenting a pair of opposed outer surfaces defining the thickness of the mat,

said body including elongated reinforcing fibers oriented in a direction transverse to said pull direction and arranged to provide transverse strength to a pultruded part containing the mat; and

said body including fiber means including entangling staple fibers extending through at least a portion of said mat thickness and randomly entangled with said reinforcing fibers, said fiber means being operable to carry the transverse fibers through the pultrusion die and to provide longitudinal strength, shear strength and anti-skewing resistance to the mat during pultrusion of a part reinforced with the mat.

86. The reinforcement mat according to claim 85, wherein said fiber means includes at least one layer of randomly oriented staple fibers and at least one layer of transport fibers arranged at an angle to the reinforcing fibers.

87. The reinforcement mat according to claim 86, wherein said transport fibers include elongated fibers extending diagonally across substantially the full transverse width of the mat and at an angle with respect to said reinforcing fibers.

88. The reinforcement mat according to claim 87, wherein said fiber means includes first and second elongated diagonal fibers extending diagonally across substantially the full transverse width of the mat with the first diagonal fibers oriented at an angle opposite the angularity of the second diagonal fibers.

89. The reinforcement mat according to claim 86, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

90. The reinforcement mat according to claim 87, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

91. The reinforcement mat according to claim 86, wherein said transport fibers includes elongated fibers extending substantially in said longitudinal direction.

92. The reinforcement mat according to claim 89, wherein said elongated transport fibers comprise stitched fibers.

93. The reinforcement mat according to claim 85, wherein the fiber means includes a binder interconnecting the reinforcing fibers and the fiber means of the mat.

94. The reinforcement mat according to claim 85, wherein the entangling staple fibers which extend through at least a portion of the mat thickness are hydro-entangled fibers.

95. The reinforcement mat according to claim 85, wherein the entangling fibers have a bending resistance less of that of the reinforcing fibers.

96. The reinforcement mat according to claim 85, wherein at least some of the entangling fibers are heat bonded to the transverse reinforcing fibers.

97. A pultruded part of constant transverse, predetermined cross-sectional shape and formed by a pultrusion die comprising:

an elongated reinforcement mat associated with the stretch of fiber rovings, said reinforcement mat including

a stretch of elongated fiber rovings;

a body having a pair of opposed outer surfaces which define the thickness of the mat, said body including elongated reinforcing fibers oriented in a direction transverse to said pull direction;

batting material in contact with said reinforcing fibers and including staple fibers, a certain proportion of said staple fibers extending through at least a portion of said mat thickness and randomly entangled with and interconnecting said reinforcing fibers; and

a synthetic resin composition enveloping said mat and the elongated fiber rovings and configured to present said predetermined desired cross-sectional shape of the part.

98. A pultruded part as set forth in claim 97, wherein the staple fibers which extend through at least a portion of the mat thickness are hydro-entangled fibers.

99. A pultruded part as set forth in claim 97, wherein said transverse fibers are disposed at an angle of from about 60° to about 90° with respect to said longitudinal pull direction.

100. A pultruded part as set forth in claim 97, wherein is included transport fibers for the reinforcing fibers arranged at an angle to the reinforcing fibers, said randomly entitled fibers extending through at least a portion of said mat thickness and interconnecting the transport fibers and the reinforcing fibers.

101. A pultruded part as set forth in claim 100, wherein said transport fibers include first and second elongated diagonal fibers extending diagonally across substantially the full transverse width of the mat with the first diagonal fibers oriented at an angle in the range from about +30° to about +60° and the second diagonal fibers being oriented at an angle in the range of from about -30° to about -60° with respect to said longitudinal pull direction.

102. A pultruded part as set forth in claim 100, wherein said transport fibers include elongated stitched fibers extending generally in said direction of pull.

103. A pultruded part as set forth in claim 102, wherein said reinforcing fibers are of glass and said elongated stitched fibers are of a polyester resin.

104. A method of preparing a mat for use and manufacture of a pultruded part where the mat, which comprises a body having a pair of opposed outer surfaces which define the thickness of the mat, is constructed to be pulled through a pultrusion die in a continuous longitudinal pull direction, said method comprising:

positioning a quantity of reinforcing fibers in a direction oriented transverse to said longitudinal pull direction; and

positioning batting material comprising staple fibers, in contact with said reinforcing fibers; and

directing at least a portion of the staple fibers of the batting material randomly through at least a portion of the mat thickness for entanglement and interconnection with said reinforcing fibers.

105. A method as set forth in claim 104, wherein direction of staple fibers of the batting material randomly through at least a portion of the mat thickness includes the step of hydro-entangling said staple fibers with the reinforcing fibers.

106. A method as set forth in claim 104, wherein said reinforcing fiber positioning step includes positioning the reinforcing fibers at an angle of about 60° to about 90° with respect to said longitudinal pull direction.

107. A method as set forth in claim 104, wherein said reinforcing fiber positioning step includes positioning the reinforcing fibers at an angle of about 90° with respect to said longitudinal pull direction.

108. A method as set forth in claim 104, wherein is included the step of binding the batting material fibers including the entangled fibers with the reinforcing fibers.

109. A method as set forth in claim 104, wherein is included the step of placing a quantity of transport fibers in a transport position with respect to the reinforcement fibers and at an angle with respect to the longitudinal length of the reinforcement fibers.

110. A method as set forth in claim 104, wherein is included the step of positioning the reinforcement fibers at an angle from about 60° to about 90° with respect to said longitudinal pull direction, and positioning the transport fibers at an angle from about 30° to about 60° with respect to said longitudinal length of the reinforcement fibers.

111. A method as set forth in claim 104, wherein is included the step of positioning the reinforcing fibers at an angle from about 60° to about 90° with respect to said longitudinal pull direction and positioning first transport fibers at an angle from about +30° to about +60° with respect to the longitudinal length of the reinforcing fibers and second transport fibers at an angle from about -30° to about -60° with respect to the longitudinal length of the reinforcing fibers.

112. A method as set forth in claim 109, wherein is included the step of applying stitching in interconnecting relationship to the reinforcing fibers and the batting material.

113. A method as set forth in claim 104, wherein is included the step of binding the batting material, including the entangled portions thereof, to the reinforcing fibers.

114. A method as set forth in claim 104, wherein is included the step of heat binding the batting material, including the entangled portions thereof, to the reinforcing fibers.

115. A method as set forth in claim 104, wherein is included the step of perforating the mat to form a series of holes extending through the thickness of the mat.

116. A method as set forth in claim 115, wherein is included the step of introducing a binding agent into the holes to permanently attach the binding material to the transverse fibers.

117. A method as set forth in claim 115, wherein is included the step of needling the mat to form the holes therethrough.

118. A method as set forth in claim 104, wherein is included the step of subjecting the fibers of the batting material to hydraulic forces from a hydro-entangler to form a set of entangling fibers.

119. A method as set forth in claim 104, wherein is included the step of limiting the thickness of the mat to no more than about 0.020 inch.

120. A method of claim 104, wherein the fibers, at least a portion of which extend through the thickness of the mat layers and extend through and interconnect the mat layers, are entangling fibers, and including the step of providing entangling fibers, at least certain of which have a lower melting temperature than other entangling fibers such that the lower melting fibers are bonded to the pull layer fibers and the angular mat fibers of the reinforcement layer during pulling of the pultruded part through the pultrusion die.